

CLAIMS

1. A substrate treatment apparatus comprising:

a substrate moving means for moving a substrate,

the first flat component prepared a predetermined distance apart above the substrate, which is moved by said substrate moving means,

the first treatment liquid passage for filling a space between said first flat component and the substrate with a treatment liquid, and

the first air knife for spraying the air to an upper surface of the substrate, which passes below said first flat component.

2. The substrate treatment apparatus according to claim 1, wherein said first treatment liquid passage fills the space between said first flat component and the substrate with the treatment liquid of a temperature higher than the normal temperature.

3. The substrate treatment apparatus according to claim 1 further comprises a means for heating the treatment liquid, which is filled into the

space between said first flat component and the substrate.

4. The substrate treatment apparatus according to claim 1, wherein said first air knife sprays the air of a temperature higher than the normal temperature.

5. The substrate treatment apparatus according to claim 4 further comprises a means prepared behind said first air knife for supplying the warm air.

6. The substrate treatment apparatus according to claim 1 further comprises a means for heating the upper surface of the substrate before, during or after the substrate passes below said first flat component.

7. The substrate treatment apparatus according to claim 1 further comprises the second flat component prepared a predetermined distance apart below the substrate, which is moved by said substrate moving means, the

second treatment liquid passage for filling a space between said second flat component and the substrate with the treatment liquid, and the second air knife for spraying the air to a lower surface of the substrate, which passes above said second flat component.

8. The substrate treatment apparatus according to claim 7, wherein said first treatment liquid passage also serves as said second treatment liquid passage.

9. The substrate treatment apparatus according to claim 7, wherein said second treatment liquid passage fills the space between said second flat component and the substrate with the treatment liquid of a temperature higher than the normal temperature.

10. The substrate treatment apparatus according to claim 7 further comprises a means for heating the treatment liquid, which is filled into the space between said second flat component and the substrate.

11. The substrate treatment apparatus according to claim 7, wherein said second air knife sprays the air of a temperature higher than the normal temperature.

12. The substrate treatment apparatus according to claim 11 further comprises a means prepared behind said second air knife for supplying the warm air.

13. The substrate treatment apparatus according to claim 7 further comprises a means for heating the lower surface of the substrate before, during or after the substrate passes above said second flat component.

14. The substrate treatment apparatus according to claim 1, wherein said substrate moving means slopes the substrate at a predetermined angle from the horizontal in a substrate moving direction while moving the substrate.

15. The substrate treatment apparatus according to claim 1, wherein said substrate moving means slopes the substrate at a predetermined angle from the horizontal in a direction perpendicular to a substrate moving direction while moving the substrate.

16. A substrate treatment method characterized by preparing the first flat component a predetermined distance apart above a substrate, filling a space between said first flat component and the substrate with a treatment liquid, and spraying the air to an upper surface of the substrate, which passes below said first flat component, from the first air knife while moving the substrate.

17. The substrate treatment method according to claim 16 characterized by filling the space between said first flat component and the substrate with the treatment liquid of a temperature higher than the normal temperature.

18. The substrate treatment method according to claim 16 characterized by heating the treatment liquid, which is filled into the space between said first

flat component and the substrate.

19. The substrate treatment method according to claim 16 characterized by spraying the air of a temperature higher than the normal temperature from said first air knife.

20. The substrate treatment method according to claim 19 characterized by supplying the warm air from back of said first air knife.

21. The substrate treatment method according to claim 16 characterized by heating the upper surface of the substrate before, during or after the substrate passes below said first flat component.

22. The substrate treatment method according to claim 16 characterized by preparing the second flat component a predetermined distance apart below the substrate, filling a space between said second flat component and the substrate with the treatment liquid, and spraying the air to a lower surface of the

substrate, which passes above said second flat component, from the second air knife.

23. The substrate treatment method according to claim 22 characterized by filling the space between said second flat component and the substrate with the treatment liquid of a temperature higher than the normal temperature.

24. The substrate treatment method according to claim 22 characterized by heating the treatment liquid, which is filled into the space between said second flat component and the substrate.

25. The substrate treatment method according to claim 22 characterized by spraying the air of a temperature higher than the normal temperature from said second air knife.

26. The substrate treatment method according to claim 25 characterized by supplying the warm air from back of said second air knife.

27. The substrate treatment method according to claim 22 characterized by heating the lower surface of the substrate before, during or after the substrate passes above said second flat component.

28. The substrate treatment method according to claim 16 characterized by sloping the substrate at a predetermined angle from the horizontal in a substrate moving direction while moving the substrate.

29. The substrate treatment method according to claim 16 characterized by sloping the substrate at a predetermined angle from the horizontal in a direction perpendicular to a substrate moving direction while moving the substrate.

30. A substrate manufacturing method characterized by drying a substrate using the substrate treatment apparatus according to claim 1.

31. A substrate manufacturing method characterized by drying a substrate using the substrate treatment method according to claim 16.

32. A substrate treatment apparatus comprising:

a substrate moving means for moving a substrate, which has the water repellency strongly on its surface, with the substrate sloped at a predetermined angle from the horizontal,

an air knife for spraying the air to the surface of the substrate, which is moved by said substrate moving means, slantingly at a predetermined incident angle, and

a treatment liquid layer forming means prepared near said air knife for supplying a treatment liquid to the surface of the substrate slantingly at a predetermined incident angle in an opposite direction of the air from said air knife so as to form a treatment liquid layer on the surface of the substrate.

33. The substrate treatment apparatus according to claim 32, wherein said treatment liquid layer forming means supplies the treatment liquid of a

temperature higher than the normal temperature to the surface of the substrate.

34. The substrate treatment apparatus according to claim 32, wherein said air knife sprays the air of a temperature higher than the normal temperature to the surface of the substrate.

35. The substrate treatment apparatus according to claim 34 further comprises a means prepared behind said air knife for supplying the warm air.

36. The substrate treatment apparatus according to claim 32 further comprises a means for heating the surface of the substrate before, during or after said treatment liquid layer forming means supplies the treatment liquid to the surface of the substrate.

37. The substrate treatment apparatus according to claim 32, wherein said substrate moving means slopes the substrate at the predetermined angle in a substrate moving direction while moving the substrate.

38. The substrate treatment apparatus according to claim 32, wherein said substrate moving means slopes the substrate at the predetermined angle in a direction perpendicular to a substrate moving direction while moving the substrate.

39. A substrate treatment method characterized by spraying the air from an air knife to a surface of a substrate slantingly at a predetermined incident angle, and supplying a treatment liquid near from said air knife to the surface of the substrate slantingly at a predetermined incident angle in an opposite direction of the air from said air knife so as to form a treatment liquid layer on the surface of the substrate while moving the substrate, which has the water repellency strongly on its surface, with the substrate sloped at a predetermined angle from the horizontal.

40. The substrate treatment method according to claim 39 characterized by supplying the treatment liquid of a temperature higher than the normal temperature to the surface of the substrate.

41. The substrate treatment method according to claim 39 characterized by spraying the air of a temperature higher than the normal temperature from said air knife to the surface of the substrate.

42. The substrate treatment method according to claim 41 characterized by supplying the warm air from back of said air knife.

43. The substrate treatment method according to claim 39 characterized by heating the surface of the substrate before, during or after supplying the treatment liquid to the surface of the substrate.

44. The substrate treatment method according to claim 39 characterized by sloping the substrate at the predetermined angle in a substrate moving direction while moving the substrate.

45. The substrate treatment method according to claim 39 characterized by sloping the substrate at the predetermined angle in a direction perpendicular to

a substrate moving direction while moving the substrate.

46. A substrate manufacturing method characterized by drying a substrate using the substrate treatment apparatus according to claim 32.

47. A substrate manufacturing method characterized by drying a substrate using the substrate treatment method according to claim 39.